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## Memo

To: CCAG Members  
 From: CCS  
 CC: ADEQ  
 Re: Draft Policy Options for Consideration  
 Date: March 17, 2006

This document provides tables of the 50 draft policy options for consideration at our upcoming Climate Action Plan Advisory Group (CCAG) meeting. At our meeting we hope to agree on next steps for action on these individual policy proposals by placing them in one of four categories for further action (below). We have suggested a course of action for each as a starting place for our discussion, and will ask the CCAG for approval of this work plan, with modifications as needed. To prepare, it would be helpful for you to be familiar with the detailed descriptions of draft policy options and suggested work plan in this document. These will be provided as handouts at the meeting and are now posted at: [www.azclimatechange.us](http://www.azclimatechange.us) for CCAG meeting (#4).

Option Category	Status Next Steps	Number of Options
1. <u>Quantifiable options</u> that are now endorsed by the CCAG.	CCS can be authorized to quantify benefits and costs as well as draft final language for presentation in the next round of TWG discussions.	19
2. <u>Difficult to quantify options</u> that are now endorsed in concept by the CCAG.	CCS can be authorized to develop draft final language for presentation in the next round of TWG discussions.	11
3. <u>Quantifiable options that lack a clear straw proposal</u> at this stage but are now endorsed in general concept by the CCAG.	CCS can be authorized to develop a straw proposal based on examples of actions provided by other states, and to present estimated benefits and costs in the next round of TWG discussions. Informal discussions with TWG members may be used to further specify key parameters.	20
4. <u>Options that the CCAG does not adequately endorse</u> at this time and require further consideration by the TWG's and CCAG.	These options may require further analysis or the development of alternative approaches for consideration by the TWG's in their next discussions.	To be determined in the CCAG meeting

**Table 1.**  
**Current Tally of Draft Policy Options**

<b>TWG</b>	<b># Current Draft Policy Options</b>
Energy Supply	12
RCI	12
Transportation and Land Use	7
Agriculture and Forestry	15
Cross Cutting Issues	4
Total	50

**Table 2.**  
**Summary of Tables to Follow:**

<b><u>Table #</u></b>	<b><u>Contents</u></b>
<b>3</b>	• Energy Supply Technical Work Group - Summary List of Draft Policy Options
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<b>11</b>	• Cross Cutting Issues Technical Work Group - Summary List of Draft Policy Options
<b>12</b>	• Description of Cross Cutting Technical Work Group Draft Policy Options

**Table 3.**

**Energy Supply Technical Work Group**  
**Summary List of Draft Policy Options (12 Total)**

#	Policy Name	Potential Next Steps
<b>RENEWABLE AND LOW-EMITTING ENERGY</b>		
ES-1	Environmental Portfolio Standard	Quantify for TWG review
ES-2	Public Benefit Charge Funds	CCS develops straw and quantifies
ES-3	Direct Renewable Energy Support (including Tax Credits and Incentives, R&D, and siting/zoning)	CCS develops straw and quantifies
<b>EMISSIONS POLICIES</b>		
ES-4	GHG Cap and Trade	Draft recommendation without quantification
ES-5	Generation Performance Standards	Quantify for TWG review
ES-6	Carbon Intensity Targets	Draft recommendation without quantification
ES-7	Voluntary Utility CO2 Targets and/or Trading	Quantify for TWG review
ES-8	CO2 Tax	Quantify for TWG review
<b>GRID AND UTILITY POLICIES</b>		
ES-9	Reduce Barriers to Renewables and Clean DG	CCS develops straw and quantifies
ES-10	Metering Strategies	CCS develops straw and quantifies
ES-11	Pricing Strategies	CCS develops straw and quantifies
ES-12	Integrated Resource Planning	Draft recommendation without quantification

**Table 4.**

## **Description of Draft Energy Supply Policy Options**

### **RENEWABLE AND LOW-EMITTING ENERGY**

#### **ES-1 Environmental Portfolio Standard**

**Description:** An environmental portfolio standard (EPS) is a requirement that utilities must supply a certain percentage of electricity from environmentally friendly sources.

**Design:**

- **ES-1a: The ACC's likely changes to the EPS, with SRP continuing with its proposed renewable investments:** 5% in 2015, 15% in 2025; Solar electric requirement down to 20% of EPS requirement; 25% of EPS requirement from distributed renewables; 10% of EPS requirement should come from an RFP for renewable generation in 2006 and 40% in 2010; Increase in Environmental Portfolio Surcharge caps; Renewable Energy Credit (REC) trading is allowed, provided that all other associated attributes are retired when applying RECs to the Annual Renewable Energy Requirement; out-of-state resources can be used provided that the necessary transmission rights are obtained and utilized.
- **ES-1b: Western Resource Associates' proposal with SRP continuing with its proposed renewable investments:** 1% in 2005, increasing 1% each year to 26% in 2025; 8% of portfolio is solar electric (2005 - 2012), then 10% in 2012 up to 20% in 2023; Retain extra credit multiplier; Allow out-of-state renewables and REC trading
- **ES-1c: Western Resource Associates' proposal with SRP meeting the same requirement.**

#### **ES-2 Public Benefit Charge Funds**

**Description:** A public benefit fund (PBF) is a state fund dedicated to support energy efficiency (EE) and renewable energy (RE), funded through a per-kilowatthour charge on electricity sales.

**Design:** Introduce a 4 mills (\$0.004) per-kWh charge and apply the proceeds as described:

**Share of total funding as follows:**

- Direct grants/buy-downs/tax credits: 60%
- Low interest revolving loans: 15%
- R&D: 10%
- Demonstration projects: 10%
- Public education: 5%

**Direct grants/buydowns/tax credits funded:**

- *Residential* (\_\_\_%): Lighting (\_\_\_%), space heating/cooling/weatherization (\_\_\_%), refrigeration (\_\_\_%), renewables (\_\_\_%)
- *Commercial* (\_\_\_%): Lighting (\_\_\_%), space heating/cooling/weatherization (\_\_\_%), refrigeration (\_\_\_%), renewables (\_\_\_%), fuel cells (\_\_\_%)
- *Industrial* (\_\_\_%): Lighting (\_\_\_%), space heating/cooling/weatherization (\_\_\_%), motors (\_\_\_%), processes (\_\_\_%), fuel cells (\_\_\_%)

**Low interest loans (focus on commercial and industrial):**

- Space heating/cooling/weatherization (\_\_\_%), refrigeration (\_\_\_%), CHP (\_\_\_%), motors (\_\_\_%), industrial processes (\_\_\_%)

**R&D funded:**

- Lighting (\_\_\_%), space heating/cooling/weatherization (\_\_\_%), refrigeration, solar (\_\_\_%), wind (\_\_\_%), CHP (\_\_\_%), motors (10%), industrial processes (\_\_\_%)

**Demonstration projects:**

**ES-3 Direct Renewable Energy Support (including Tax Credits and Incentives, R&D, and siting/zoning)**

**Description:** Direct renewable energy support can take many forms including tax credits and incentives, R&D and siting/zoning. This suite of policies encourages investment in renewables by providing direct financial incentives and by removing barriers to siting and zoning renewable energy facilities. Development of new renewable technologies is also encouraged by funding of R&D.

**Design:** The TWG believes that the buy-down program below that APS has proposed to the ACC provides a good starting point.

**PV Systems**

- Grid Tied: \$3/watt DC
- Off-Grid: \$2/watt DC

**Solar Water Heating**

- \$0.50 per first year kwh savings based on OG-300 rating (for systems up to 10,000 kwh/yr)
- \$0.07 per kwh equivalent (3412 BTU = 1 kwh) based on metered production for a maximum of 10 years or 50% of project cost including financing.

#### Solar HVAC

- \$0.16 per kwh equivalent (3412 BTU = 1 kwh) based on metered production for a maximum of 10 years or 50% of project cost including financing.

#### Direct subsidies:

- Between 20\_\_ and 20\_\_, \_\_\_% of capital cost for all solar and wind systems 500 kW or less. \_\_\_% of capital cost for all biomass facilities 500 kW or less. From 20\_\_ to 20\_\_, \_\_\_% of capital cost for all solar and wind systems 500 kW or less. \_\_\_% of capital cost for all biomass facilities 500 kW or less.

#### Feed-in tariffs:

- Starting in 20\_\_, payment of \_\_\_ cents/kWh, in addition to the wholesale market price of generation, to all (new?) grid-connected solar (PV and thermal), wind, biomass, and geothermal systems greater than 500 kW. Generation from qualifying renewable facilities will be sold to local utilities that are required to pay the wholesale market price plus the feed-in tariff. The added cost to utilities can be recovered through utility rates. Utilities can limit the total renewable generation purchased to \_\_\_% of total sales on a first come first served basis for renewable generators. The payment of \_\_\_ cents/kWh will continue to 20\_\_ when it will drop to \_\_\_ cents/kWh. Starting in 20\_\_, the payment will drop to \_\_\_ cents/kWh. In 20\_\_, the payment will drop again to \_\_\_ cent/kWh and will cease in 20\_\_.

#### R&D funding:

## EMISSIONS POLICIES

### ES-4 GHG Cap and Trade Program

**Description:** A cap and trade system is a market mechanism in which CO2 emissions are limited or capped at a specified level, and those participating in the system can trade permits (a permit is an allowance to emit one ton of CO2) in order to lower costs of compliance.

**Design:** The TWG's primary interest is in a national economy-wide cap and trade program. The TWG wants to look at existing studies of such programs to infer what the impact on Arizona may be. There is also some interest in exploring the viability of a regional economy-wide and/or power sector program.

#### Other issues to consider:

- Applicability (sources & sectors included)
- Gases included
- Permit allocation rules (method; options for new market entrants)
- Generation-based or load-based; leakage concerns
- Linkage to other trading systems
- Banking and borrowing; early reduction credit

- Inclusion of emission offsets (within or outside sector, geography)
- Incentive opportunities (e.g., interaction with other pollution regulations like Pennsylvania's EDGE program)

### ES-5 Generation Performance Standards

**Description:** A generation performance standard (GPS) is a requirement that electricity utilities or load serving entities (LSE) sell electricity with an average emission rate below the generation portfolio standard.

**Design:** Apply a GPS only to new generation. As new capacity comes on-line, those plants would receive an allocation based on the GPS standard. Utilities could trade permits in order to achieve the standard, but there would be no fixed cap on emissions. The GPS level would be equivalent to a new natural gas combined cycle plant. Assessment of this option should consider that new electricity demand in Arizona might be served, at least in part, by out-of-state resources. Accordingly, analysis of this option should consider how a GPS policy might affect decisions to build new capacity inside or outside of Arizona.

### ES-6 Carbon Intensity Targets

**Description:** Rather than a fixed cap on carbon emissions, a carbon intensity target is a limit on the ratio of carbon emissions to a measure of output. Absolute emissions can increase as output increases.

**Design:** The TWG is still discussing this item. In its last call, the TWG suggested using an approach akin to the recommendations of the National Commission on Energy Policy. New policy design parameters will be drafted to reflect this guidance.

- Arizona implements a mandatory carbon intensity target that begins in 20\_\_ (equal to carbon intensity in 20\_\_) and that declines by \_\_% annually through 20\_\_. The carbon intensity target is translated annually into a cap, and trading is allowed under that cap.

### ES-7 Voluntary Utility CO2 Targets and/or Trading

**Description:** Voluntary targets can take a number of different forms. A target can be voluntarily undertaken by a company outside the context of a government program for voluntary reduction and not be legally binding.

**Design:** The DOE Power Partners Initiative offers a possible model for a voluntary carbon intensity target in the power sector. The Power Partners Initiative calls for reductions in carbon intensity of 3-5% below 2000-2002 levels, as measured over the 2010-2012 period. Assuming that a 3% reduction in intensity would be achieved, a quick calculation suggests a ~1.5%

reduction in electricity sector emissions in the 2010-2012 period relative to the reference case would result.

### ES-8 CO2 Tax

**Description:** A CO2 tax is a tax on every ton of CO2 emitted. Companies would either pass the cost on to consumers or would change production to lower emissions or a combination of the two.

**Design:** A flat \$5 per ton economy-wide, upstream CO2 tax. Plans call for analyzing this tax on a national basis and evaluating the resulting impact on Arizona. Other levels may be assessed to the extent that resources permit.

## GRID AND UTILITY POLICIES

### ES-9 Reduce Barriers to Renewables and Clean DG

**Description:** Remove barriers to renewables and clean DG including: commercialization barriers; price distortions; failure of the market to value the public benefits of renewables; failure of the market to value the social cost of fossil fuel technologies; and market barriers such as inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and transmission costs are often higher for renewables.

**Design:** Policies to remove barriers include:

- Standard interconnection policies
- Procurement policies (e.g., state power purchases, loading order requirements, long-term contracting with clean DG, etc.)
- Environmental disclosure

The CCAG needs to approve an assumption that implementing the policies above would lead to a \_\_\_\_% increase in renewables and clean distributed generation.

### ES-10 Metering Strategies

**Description:** There are two common metering strategies and policies, net metering and advanced metering. Net metering allows owners of grid-connected distributed generation (generating units on an electricity customer's side of the meter) to generate excess electricity, and sell it back to the grid, effectively turning the customer's meter backward. Advanced metering is a technology that allows electricity consumers much greater opportunity to manage their electricity consumption.



**Design:** The CCAG needs to approve an assumption about how much new distributed generation, and what types, would be installed as a result of net metering. The CCAG also needs to make an assumption about the reduction in electricity consumption resulting from advanced metering.

- *Net metering:* All distributed renewables are eligible for net metering. All combined heat and power technologies are eligible. Fossil DG units not in combined heat and power mode must have emission rates better than \_\_\_\_ tons CO<sub>2</sub> per kWh and be smaller than \_\_\_\_ MW to be eligible.
- *Advanced metering:* Arizona implements a policy that pays for \_\_\_\_% of the installed cost of advanced meters and requires that utilities pay for \_\_\_\_% and install them for all customers who request them.

## ES-11 Pricing Strategies

**Description:** Pricing strategies can take many forms including: *real-time pricing* in which utility customer rates are not fixed, but reflect the varying costs that utilities themselves pay for power; *“time-of-use” rates*, which are fixed rates for different times of the day and/or for different seasons; *“increasing block” rates* that are defined by blocks of consumption; *green pricing* whereby customers are given the opportunity to purchase electricity with a renewable or cleaner mix than the standard supply mix offered by the utility; and *advanced metering* to allow electricity consumers much greater opportunity to manage their electricity consumption.

**Design:** The CCAG needs to approve an assumption about the impacts of the above pricing strategies on peak and overall demand.

- Implementation of one or more of the above policies would result in the shift of \_\_\_\_ MWhs of on-peak demand to off-peak demand. These policies would also result in a decrease of \_\_\_\_% in overall demand.

## ES-12 Integrated Resource Planning

**Description:** Integrated Resource Planning (IRP) is a process that diverges from traditional utility least-cost planning. Rather than simply focusing on supply-side options to meet a forecasted growth in emissions, IRP integrates technology and policy options on the demand side with supply side options to satisfy the anticipated demand for energy services. Demand-side measures include energy efficiency, distributed generation, and peak-shaving measures. IRP typically also takes into account a broader array of costs, including environmental and social costs.

**Design:** Quantifying CO<sub>2</sub> reductions under a policy mandating IRP would require, in effect,

conducting integrated resource planning for all utilities in the state, which is well beyond the scope of this stakeholder process. Results of a cap and trade policy combined with extensive energy efficiency investments may approximate the results of such a policy. To quantify this option, the CCAG needs to approve a “shadow price” to be implemented in the fashion described below:

IRP is an involved process that, by its nature as a bottom-up planning methodology at the utility level, does not lend itself to setting implementation levels per se. The value given to emissions for use in the planning process can be specified, however. In the context of a climate-driven Arizona IRP, a “shadow price” of \$\_\_\_ per ton will be assigned to CO<sub>2</sub> emissions. In making decisions about which resources to use to satisfy demand for energy services, utilities would be required to apply this \$\_\_\_/ton of CO<sub>2</sub> adder in their evaluation of technologies and approaches; utilities would not actually be required to pay \$\_\_\_/ton.

- The TWG needs to decide whether an analysis based on applying a shadow price of \_\_\_\$/ton CO<sub>2</sub> would approximate the results of an IRP process. The TWG may also consider assuming that a certain level of energy efficiency is implemented as a result of IRP.

**Table 5.**

**Residential Commercial and Industrial Technical Work Group**  
**Summary List of Draft Policy Options (12 Total)**

#	Policy Name	Potential Next Steps
	<b>RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL</b>	
<b>RCI-1</b>	Demand-Side Efficiency Goals, Funds, Incentives, and Programs	Quantify for TWG review
<b>RCI-2</b>	State Leadership Programs	Quantify for TWG review
<b>RCI-3</b>	Appliance Standards	Quantify for TWG review
<b>RCI-4</b>	Building Standards/Codes for Smart Growth	Quantify for TWG review
<b>RCI-5</b>	“Beyond Code” Building Design Incentives and Programs for Smart Growth	Quantify for TWG review
<b>RCI-6</b>	Distributed Generation/Combined Heat and Power	Quantify for TWG review
<b>RCI-7</b>	Distributed Generation/Renewable Energy Applications	Quantify for TWG review
<b>RCI-8</b>	Electricity Pricing Strategies	Draft recommendation without quantification
<b>RCI-9</b>	Mitigating High Global Warming Potential (GWP) Gas Emissions (HFC, PFC)	Draft recommendation without quantification
<b>RCI-10</b>	Demand-Side Fuel Switching	Quantify for TWG review
<b>RCI-11</b>	Industrial Sector GHG Emissions Trading or Commitments	Draft recommendation without quantification
<b>RCI-12</b>	Solid Waste, Wastewater, and Water Use Management	CCS develops straw and quantifies

**Table 6.**

**Description of Draft Residential Commercial and Industrial Policy Options**

**RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL**

**RCI-1 Demand-Side Efficiency Goals, Funds, Incentives, and Programs**

**Description:** This policy option considers energy savings goals for electricity and natural gas, and the policy, program, and funding mechanisms that might be used to achieve these goals. These are intended to work in tandem with other strategies under consideration by the RCI and ES TWGs.

**Design:** This option contains the following three principal elements, along with several supporting activities:

**Goals:** Suggested energy savings goals are as follows:

- Electricity (energy savings target): 5% savings by 2010, 15% savings by 2020. These savings targets would be for electricity sales (MWh), and would reflect cumulative (from today), verified savings as a percentage of those years' (projected) loads.
- Natural Gas (utility spending target): ramp up to spending 1.5% of revenues by 2010.<sup>1</sup> (Note that this would represent a doubling of Southwest Gas' DSM funding, from a level of 0.8%, which is expected to be approved shortly. With further decisions to decouple gas sales and revenues, a higher target might be possible. On the other hand, without decoupling, a 1.5% target may be too ambitious.)

**Funding and Implementation Mechanisms:** Several policy options are commonly used to overcome market, administrative, and institutional barriers to cost-effective efficiency improvements. These options can include public benefit charges, tariff riders, enabling legislation, and/or regulatory directives. They can also work together with state and national tax incentives for energy efficient equipment. Specific funding and implementation mechanisms will be determined pursuant to the analysis of the energy savings goals above.

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<sup>1</sup> Electricity and natural gas goals are deliberately expressed in different metrics -- energy savings and revenue targets, respectively -- due to recognized differences in experience with efficiency programs with each fuel. Experience with electricity efficiency is sufficient to enable targets to be established, as has been done in several states (e.g. CA and TX). Experience with natural gas efficiency programs is more limited, thus it may be premature to establish energy savings goals.

**Incorporation of Efficiency in a Planning Context:** Inclusion of energy efficiency resource in an integrated resource planning (IRP) process can enable the overall most efficient and cost-effective delivery of energy services. IRP is currently practiced in Arizona, and is under consideration by the ES TWG.

In addition, supporting activities may be important elements in the success of energy efficiency strategies. These supporting strategies could include consumer education and outreach programs, and market transformation programs and organizations. Supporting strategies will be considered as part of overall recommendations, but their impacts will not be quantified. They could also include decoupling utility sales and revenues and creating performance incentives that reward utilities for implementing effective DSM programs.

### RCI-2 State Leadership Programs

**Description:** ‘Lead by Example’ initiatives help state and local governments achieve substantial energy cost savings while promoting the adoption of clean energy technologies by the public and private sectors.

**Design:** The policy action under consideration would include:

- Extension of state building energy savings goals (Statute A.R.S. 34-45) to include a further 15% reduction in energy use per square foot in state buildings from 2011 to 2020, along with purchasing of EnergyStar equipment.
- Standards for new state buildings, with possible design parameters including recommendations for new buildings to be [X%] better than code or LEED-related requirements, such as those recommended by the Arizona Working Group on Renewable Energy and Energy Efficiency and by the WGA CDEAC EE<sup>2</sup> Task Force (See also Option RCI-5), as well as mechanisms to support the state in achieving its goals.
- Green Procurement Strategies, such as installation of renewable energy systems as additional backup services in emergency services buildings, and efforts to promote or require the purchase by state buildings of 5% of their building energy needs from renewable sources (over a phased-in period) by 2012.
- The promotion of new combined heat and power (CHP) facilities in State Buildings, such as ASU’s 8MW facility soon to come on-line, including the expansion of existing performance contracting law to require life cycle analysis for CHP in State lease-purchase construction.

### RCI-3 Appliance Standards

**Description:** Implementation of State appliance efficiency standards for appliances not covered

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<sup>2</sup> Energy Efficiency Task Force Report to the Clean and Diversified Energy Advisory Committee of the Western Governors’ Association

by federal standards or where higher-than-federal standard efficiency requirements are appropriate.

**Design:** Appliance efficiency standards reduce the market cost of energy efficiency improvements by incorporating technological advances into base appliance models, thereby creating economies of scale. Appliance efficiency standards can be implemented at the state level for appliances not covered by federal standards. Arizona, along with several other states, recently adopted state level appliance efficiency standards covering several appliances. State actions led the Federal government to adopt rule making for these appliances in the 2005 energy bill. California has established standards for a number of appliances not covered by Arizona or national legislation, such as pool pumps, consumer electronics (stand-by power use), and general-service incandescent lamps.

The specific policy approach suggested by the TWG is to:

- First, advocate for stronger federal appliance efficiency standards where this is technically feasible and economically justified.
- Second, for those appliances not likely to be covered by federal efforts, pursue efficiency standards already adopted by California and/or other states.
- Where possible, consider encouraging local manufacturing of high-efficiency appliances and equipment when adopting state standards.

#### RCI-4 Building Standards/Codes for Smart Growth

**Description:** Given the State's growth and the long lifetime of buildings, the current and future building codes will have a considerable impact on future energy use in buildings, and on related greenhouse gas emissions, thus improved and increasingly stringent energy efficiency codes for Arizona are proposed.

**Design:** Building energy codes specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing a major renovation. It is recommended that Arizona take the following actions in order to realize the energy savings and other benefits offered by state-of-the-art building energy codes<sup>3</sup>:

- Arizona should either establish a statewide mandatory code or strongly encourage local jurisdictions to adopt and maintain state-of-the-art codes. Adoption is targeted for 2007, with codes in force in early 2008, but with the recognition that some municipalities in Arizona may implement energy efficiency codes later than others.
- Arizona and/or local jurisdictions should adopt the 2004 International Energy Conservation Code (IECC), to the extent that adoption has not already occurred. Also,

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<sup>3</sup> Many of these suggestions are consistent with recommendations included in the WGA CDEAC EE report (for example, page 59).

Arizona and/or local jurisdictions should consider adopting innovative features of California's latest Title 24 building energy codes, such as lighting efficiency requirements in new homes. In considering the adoption of building code elements, Arizona and/or local jurisdictions should take into account the time-dependent value of energy by, for example, noting the extra benefits from code revisions that are particularly effective in saving on-peak electricity or gas.

- Arizona and local jurisdictions should update energy codes regularly. A three-year cycle could be timed to coincide with release of the national model codes.
- Revised building codes for Arizona as a whole and for local jurisdictions should be prepared with the involvement of local chapters of code organizations to assist in obtaining support for and compliance with the new policies. All buildings will be covered, including manufactured homes, and local building inspectors will enforce compliance with codes. Inspectors need to be properly trained in new elements of the codes.

#### **RCI-5 "Beyond Code" Building Design Incentives and Programs for Smart Growth**

**Description:** Building energy performance standards are implemented in State-funded and other (such as local) government buildings, and similar standards are promoted in other buildings, such that new buildings achieve high standards of energy efficiency, and existing buildings are renovated or retrofitted to yield significant energy efficiency improvements.

**Design:** Implementation of LEED (Leadership in Energy and Environmental Design) standards/certifications and/or other "green building" certifications and/or measured or modeled building energy performance criteria may be used to specify building energy performance standards. Implementation of white roofs, rooftop gardens, and landscaping (including shade tree programs) would also be covered by this policy. In addition to directly influencing energy use in state-funded and government buildings, this policy will help to raise awareness of energy-efficiency improvement methods in building construction and operation, and will help to "drive" such improvements in other market segments. This policy includes:

- A performance standard for State-owned or state-leased buildings to demonstrate the feasibility of not only achieving the minimum code requirements but also exceeding them. This will demonstrate and encourage the use of advanced energy efficiency products and designs, and will also reward the State with the inherent benefits of more efficient buildings. New state-owned or state-leased buildings will be required to use at least *10 percent* less energy per square foot of floor space relative to what the same building would have used if designed to just meet existing energy codes. The requirement of *10 percent* lower energy use will be reviewed periodically, but is expected to remain in force as long as the level of improvement remains cost-effective.
- A requirement that state-owned or leased facilities use life-cycle costing, including full consideration of future energy costs, in the selection and implementation of building designs and components for both new and renovated space, or for the selection of replacement components. Further, following life cycle cost analysis, require that the

most cost-effective design/equipment/component options be chosen.

- Provide financial or tax incentive for non-public and non-state public buildings (such as municipal buildings) to improve their energy performance beyond that required by existing codes. Incentives should be provided for building projects (new, renovated, or remodeled space) where energy consumption per unit floor area is at least *10 percent* less than that would be the case if the project just met existing codes. Incentives should be structured so that projects that produce higher savings per unit floor area relative to just meeting code requirements receive greater incentives.
- Performance standards life cycle costing requirements, and incentive programs to begin in year 20xx.

#### RCI-6 Distributed Generation/Combined Heat and Power

**Description:** Distributed generation with clean combined heat and power systems improves the overall efficiency of fuel use as well as electricity system benefits. Implementation of these systems should be encouraged through a combination of regulatory changes and incentive programs.

**Design:** Distributed generation in the form of clean combined heat and power systems give electricity consumers the capability of generating electricity or mechanical power on-site to meet all or part of their own needs, sell power back to the grid, and, through capture of heat typically lost during power generation, meet on-site thermal needs (hot water, steam, space heat, or process heat) or cooling (for example, through application of absorption chillers)<sup>4</sup>. In so doing, distributed generation with combined heat and power (CHP) raises the overall efficiency with which fuel is used. In addition to improvements in the efficiency of fuel use, and related reduction in greenhouse gas emissions, expanded use of distributed CHP offers significant electricity system benefits (including avoided electricity transmission and distribution losses, and avoided requirements for electricity grid expansion). Policies to encourage the adoption of CHP include a combination of regulatory changes and possibly incentives for adoption of CHP systems. CHP systems of 10 MW or smaller (or of equivalent mechanical power) would be covered, and policies in place by the end of 2006, and in force thereafter, with periodic review as needed. The combination of regulatory changes and incentives will be designed to allow XX percent of Arizona's estimated remaining CHP potential to be realized by the year 20xx.

#### RCI-7 Distributed Generation/Renewable Energy Applications

**Description:** Distributed generation sited at residences and commercial and industrial facilities, and powered by renewable energy sources, provides electricity system benefits and displaces fossil-fueled generation, thus reducing greenhouse gas emissions. Increasing the use of renewable distributed generation in Arizona can be achieved through a combination of regulatory

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<sup>4</sup> The CCAG suggested that this policy option could be expanded to include on-site electricity generation from waste heat.



changes and incentives.

**Design:** Customer-sited distributed generation powered by renewable energy sources provides electricity system benefits such as avoided capital investment and avoided transmission and distribution losses, while also displacing fossil-fueled generation and thus reducing greenhouse gas emissions. Customer-sited renewable distributed generation can include solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, geothermal generation systems, and systems fueled with biomass wastes or biomass collected or grown as fuel. Policies to encourage and accelerate the implementation of customer-sited renewable distributed generation include direct incentives for system purchase, market incentives—including “net metering”—related to the pricing of electricity output by renewable distributed generation, state goals or directives, and favorable rules for interconnecting renewable generation systems with the electricity grid. Non-electric renewable energy applications also covered by this policy include solar water heat and solar space heat and cooling. It is suggested that Arizona should, at a minimum, set as its target the addition of customer-sited distributed renewable generation consistent with the overall generation capacity by year goals for renewable distributed generation in the West as expressed in the WGA CDEAC reports.

#### RCI-8 Electricity Pricing Strategies

**Description:** Adjustments in electricity pricing to reflect the true time-dependent cost and value of generation are suggested as means to both lower the overall costs and emissions from electricity system operation and to encourage the implementation of clean customer-sited combined heat and power and distributed generation.

**Design:** As with other energy and non-energy commodities, the pricing of electricity—including electricity from the grid used by consumers and electricity generated on the consumers’ premises flowing to the grid—can have a significant impact on consumers’ usage decisions. Proper and clear electricity tariffs and price signals can provide significant encouragement to distributed generation, energy conservation (in many forms), and reduction of electricity use during times of peak electricity demand. Creating such tariff structures may involve restructuring tariffs to provide incentives for “shoulder<sup>5</sup>” and peak demand reduction—for example, through implementation of time-of-use energy charges—as well as setting net metering or other rules for sales from distributed generation to the grid that provide appropriate credit for the electricity generated during periods of high power demand. Changes in tariff structures are also needed that revise the balance between energy and demand charges and change the way that demand charges are fixed. These changes should be designed so as to provide improved incentives for end-users to adjust the timing of energy use so as to reduce greenhouse gas emissions as much as possible.

These tariff and pricing changes should be implemented by 20xx so as to remove barriers to and

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<sup>5</sup> “Shoulder” periods of electricity demand occur in the periods before and after the period of daily system peak power demand.

create incentives for customer-sited CHP and renewable generation as soon as possible. Note that it will likely not be possible to isolate the impacts of these tariff and pricing changes from policies such as RCI-1, RCI-2, RCI-6, and RCI-7, and as such the costs and impacts of these tariff and pricing policies will likely be taken into account in the quantification of costs and impacts other RCI policies (which RCI-8 policies support). To avoid double counting, then, the costs and impacts of tariff and pricing changes will likely not be quantified separately.

### RCI-9 Mitigating High Global Warming Potential (GWP) Gas Emissions (HFC, PFC)

**Description:** A combination of voluntary agreements with industries and of new specifications for key equipment is suggested to reduce the emissions of process gases that have high global warming potential.

**Design:** Based on the current AZ emissions inventory and projection, GHG emissions from hydrofluorocarbons (HFCs) could grow from about 1 MMtCO<sub>2</sub>e or <1% of Arizona GHG emissions in 2000 to over 7 MMtCO<sub>2</sub>e or about 5% of state emissions by 2020. Most HFC emissions are expected to result from leaks in mobile air conditioning and refrigeration applications. Other sources of high Global Warming Potential (GWP) gases, which include the emission of perfluorocarbons (PFCs) and HFCs and from semiconductor manufacture and leakage of sulfur hexafluoride (SF<sub>6</sub>) from electricity distribution equipment, contribute less to state emissions, and these emissions are expected to decline based on existing emission reduction efforts, such as the semiconductor industry's voluntary worldwide agreement. Based on a review of available options to further reduce high-GWP gas emissions in the RCI sectors, the TWG suggests further consideration of specifications for new commercial refrigeration equipment. Such specifications—now under consideration in California—would: a) promote the use of low GWP refrigerants<sup>6</sup> in refrigerators in retail food stores, restaurants, and refrigerated transport vehicles (trucks and railcars); and/or b) require or provide incentives that centralized systems with large refrigerant charges and long distribution lines be avoided in favor of systems that use much less refrigerant and lack long distribution lines.

While a focus on commercial refrigeration emerged from TWG discussions, participants also noted that maintaining momentum of voluntary industry-government partnerships (such as the semi-conductor industry agreement) should be a high priority.

### RCI-10 Demand-Side Fuel Switching

**Description:** Reductions in greenhouse gas emissions can be achieved in the residential, commercial and industrial end-use sectors when consumers switch to the use of less carbon-intensive fuels to provide key energy services.

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<sup>6</sup> Examples include lower GWP HFCs, carbon dioxide, and hydrocarbons (HCs - propane or isobutene/propane blend).

**Design:** Fuel switching opportunities can include using natural gas in the place of electricity for thermal end-uses, natural gas in the place of coal for key industrial end-uses, biomass fuels in the place of electricity or natural gas for thermal end-uses, and solar thermal energy in the place of electricity or natural gas for thermal end-uses.

The TWG suggests the two following options:

- The promotion of solar water heating through a combination of incentives and targeted research. These would build on incentives that already exist in the State.
- The substitution of biofuels for diesel and gasoline use in commercial and industrial equipment. Inventory estimates suggest that diesel/distillate fuel and gasoline use in commercial and industrial sectors comprised nearly 3% of the state's emissions in 2003 (2.7 million MMtCO<sub>2</sub>), thus the potential for emissions reductions could be quite significant.

### RCI-11 Industrial Sector GHG Emissions Trading or Commitments

**Description:** Industrial sector GHG emissions trading systems, with mandatory “caps” or voluntary emissions, are a means of limiting overall emissions while providing firms with choices as to how emissions limits will be achieved.

**Design:** Emissions cap and trade programs and/or voluntary emissions targets are options that have been considered for systematically addressing industrial sector GHG emissions. For example, a number of large industries (such as steel and cement) are included within the European emissions trading system, and have been proposed for inclusion in national legislation. Voluntary commitments have also been adopted within the US and internationally, exemplified by the US Climate Leaders program. This policy option specifically addresses how industrial sector sources would be addressed by trading systems and/or voluntary commitments.

The TWG suggests that an important first step would be to encourage the adoption of procedures to assist in the development of organizational GHG inventories, as would be enabled by a GHG registry.

RCI TWG members believe that emissions trading<sup>7</sup>, in general, is a good idea. TWG members feel that a regional or national program approach would be preferable to a state level one. They feel that because the CCAG is a state-level advisory group, it may exceed the mandate of the CCAG to attempt development of a straw proposal; rather, an institution at a regional level or national level would best develop the concept and design elements. A recommendation for the CCAG to consider is a request that the governor explore a regional emissions trading program in a regional forum and/or advocate for development of national program.

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<sup>7</sup> Some TWG members feel that reference to emissions trading should explicitly include consideration of an emissions cap. There was not full TWG consensus on this matter.

## RCI-12 Solid Waste, Wastewater, and Water Use Management

**Description:** Policies to reduce solid waste production and related landfill methane emissions through recycling and composting, as well as policies to reduce greenhouse gas emissions related to wastewater and water use management, have not yet been considered in any detail by the RCI TWG

### Design:

Possible actions to reduce GHG emissions from waste and wastewater management could include:

- Increase average statewide waste wood and mixed paper recovery rates to xx% by 20xx.
- Increase average statewide paper, plastic, metals and other materials recovery rates to xx% by 20xx.
- Implement food and yard waste composting.
- Capture and use (potentially displacing fossil fuel use) and/or flare methane at small non-NSPS landfill sites.

Possible actions to reduce GHG emissions through water use management include:

- Reductions in electricity needs for water pumping due to from reduced water demands by RCI users and other sectors such as agriculture and electricity generation, or due to improved water management. (Note that to the extent ground water pumping as well as surface water delivery is due to agricultural demands, the AF TWG may best address this option.)
- Recover and use (potentially displacing fossil fuel use) methane from wastewater processing activities

**Table 7.**

**Transportation and Land Use Technical Work Group**  
**Summary List of Draft Policy Options (7 Total)**

#	Policy Name	Potential Next Steps
	<b>PASSENGER VEHICLE GHG EMISSION RATES</b>	
TLU-1	California GHG Emission Standards	Quantify for TWG review
	<b>LAND USE AND LOCATION EFFICIENCY</b>	
TLU-2	Smart Growth Bundle of Options	CCS develops straw and quantifies
	<b>INCREASING LOW-GHG TRAVEL OPTIONS</b>	
TLU-3	Multimodal Transit Bundle of Options	CCS develops straw and quantifies
	<b>FREIGHT</b>	
TLU-4	Promote Idle Reduction Technologies	Quantify for TWG review
TLU-5	Enforce Anti-Idling	Quantify for TWG review
	<b>FUELS</b>	
TLU-6	Standards for Ethanol and Biodiesel Fuels	Draft recommendation without quantification
TLU-7	Gasoline Tax	CCS develops straw and quantifies

Table 8.

## Description of Draft Transportation and Land Use Policy Options

### PASSENGER VEHICLE GHG EMISSION RATES

#### TLU-1 California GHG Emission Standards

**Description:** Adopt the California GHG emission standards (also known as the “Pavley” standards or “Clean Car Program”) in order to reduce the net emissions of GHG’s from passenger vehicle operation.

**Design:** New cars and light trucks in all states must comply with Federal emission standards, and, generally speaking, states have the choice of adopting a stronger set of standards applicable in California. In 2005, California finalized a set of standards that would require reductions of GHG emissions of about 30 percent from new vehicles, phased in from 2009 to 2016, through a variety of means. The standards must still be approved by USEPA, and face a court challenge.

### LAND USE AND LOCATION EFFICIENCY

#### TLU-2 Smart Growth Bundle of Options

**Description:** This bundle of options encompasses four components related to reducing GHG emissions through land use practices and policies. These policies contribute to GHG emission reductions by reducing vehicle trips and total vehicle miles traveled.

**Design:** Smart growth actions include the following programs and program elements:

- **Infill and Brownfield redevelopment.** Shifting housing and commercial development toward location efficient sites, such as brownfields, and away from location inefficient sites, such as greenfields, can reduce overall travel demand and expand lower emitting mode choices. Brownfields are commercial or industrial properties that are abandoned or are not being fully used because of actual or perceived environmental contamination. These properties have potential for redevelopment, but the uncertainty and risk of environmental liability and the cost of investigation and cleanup keep them from being redeveloped. Brownfields can be former industrial properties, abandoned gas stations, vacant warehouses, or former dry-cleaning establishments. Redevelopment of these environmentally contaminated properties creates jobs, revitalizes neighborhoods, increases property and sales tax revenues, decreases urban sprawl, and reduces potential health risks to the local community.

- **Transit-oriented development** includes a shift to lower emitting mode choices by building compact development around transit stops to meet daily needs by foot or transit and/or by clustering employment centers around transit stops.
- **Smart growth planning**, modeling, and tools includes a number of practices aimed at encouraging location efficient growth in communities that are proximate to household amenities (such as jobs, shopping, school, services, entertainment, etc.) as opposed to growth in areas that are not proximate and require greater travel distance and have less mode choice. Smart growth allows for mixed land uses within a project with a range of housing opportunities and multiple transportation options including pedestrian/bike access.
- **Targeted open space protection** includes programs designed to protect and conserve State lands, and develop and improve neighborhood, community, and regional parks in ways that encourage location efficient growth and broader mode choice.

Specific policy measures would include:

- Promote use of authority under Growing Smarter/Plus by counties to impose development fees consistent with municipal development fee statutes.
- Promote use of authority under Growing Smarter/Plus by cities to create infill incentive districts and plans that could include expedited process incentives.
- Promote use by cities of a fee waiver system, similar to Phoenix Infill Housing Program, to encourage development of single-family owner-occupied housing on vacant, orphaned, or underutilized land located in the mature portions of Arizona.
- Provide technical assistance to communities that want to pursue Smart Growth and disseminate lessons learned in cities such as Phoenix and Tucson.
- Provide Smart Growth information tools that identify the qualitative (e.g., improved quality of living) and quantitative benefits (e.g., reduced vehicle operation costs) of these Smart growth communities.
- Encourage lenders to apply location-efficient mortgage principles, so transportation cost savings is recognized when calculating a household's borrowing ability.
- Require that cities update their engineering plans and standards to make road and sidewalk infrastructure friendlier to bikes and pedestrians.

**Goals to be determined:** Target an overall reduction in VMT from passenger vehicles of x% by year XXXX through a combined approach utilizing a number of programs that fall under those listed above.

## INCREASING LOW-GHG TRAVEL OPTIONS

### TLU-3 Multimodal Transit Bundle of Options

**Description:** This bundle of options includes actions to shift passenger transportation mode

choice (auto, bus, rail, bike, pedestrian, etc.) to lower emitting choices, and includes: make better use of CMAQ funds; expand transit infrastructure (rail, bus, BRT); improve transit service, promotion, and marketing; improve bike and pedestrian infrastructure.

**Design:** Target an overall shift in mode choice for passenger travel from the existing reference case of \_\_\_\_\_ to a new scenario of \_\_\_\_\_ by year 20xx through a combined approach utilizing a number of programs that fall under those listed above.

## FREIGHT

### TLU-4 Promote Idle Reduction Technologies

**Description:** Anti idling actions reduce emissions from stationary freight vehicles (potentially wasted energy) by expanding use of available technologies that reduce heavy-duty vehicle idling, including: automatic engine shut down/start up system controls; direct fired heaters (for providing heat only); auxiliary power units; and truck stop electrification.

**Design:** The purpose of this measure is to reduce idling from diesel vehicles through programs aimed at increasing voluntary adoption of idle reduction technologies. ADEQ and the county agencies would collaborate on outreach and education beginning in the year 2008, to coincide with measures TLU-5, enforcing idling restrictions. The State would also seek funding for pilot projects and demonstrations from CMAQ (Congestion Mitigation Air Quality) funds, as well as funds available through EPA, DOE, and DOT. These pilot programs could be used to evaluate the effectiveness of various idle reduction technologies prior to more widespread use throughout the state. The outreach materials should emphasize the benefits of reducing idling, including a reduction in fuel costs, GHG emissions, and toxic emissions.

### TLU-5 Enforce Anti-Idling

**Description:** This measure recommends statewide adoption of an anti-idling ordinance to be applied to both gasoline and diesel-powered heavy-duty vehicles and buses.

**Design:** Currently, only Maricopa County has an anti-idling ordinance (applies to diesel vehicles with a gross vehicle weight rating of more than 14,000 lbs. and restricts idling to 5 minutes or less, except under exempted conditions). This ordinance has not been enforced due to a lack of enforcement funding and enforcement authority. This policy would build off of the Maricopa County ordinance, strengthen it, and make it applicable statewide by the end of 2008. Idling of vehicles, particularly heavy-duty diesel trucks and buses, contributes to CO<sub>2</sub> and black carbon emissions, as well as toxics, PM, and NO<sub>x</sub> emissions. Elimination of most idling would significantly reduce fuel consumption from these vehicles, as well as the associated emissions. The statewide ordinance should be designed to be easily enforceable by the appropriate state and local agencies, and should have a dedicated funding stream for enforcement. The ordinance would also need to limit exemptions as much as possible, to make it easier to enforce. Compliance with the ordinance should be encouraged through additional education and outreach efforts so that the maximum GHG benefits of this ordinance can be achieved.



**Goals to be determined:** Target an overall reduction in idling of \_\_% (or a reduction in idling fuel consumption of xx gallons of fuel) by year 20xx.

## FUELS

### TLU-6 Standards for Ethanol and Biodiesel Fuels

**Description:** Develop and enforce standards for ethanol and biodiesel fuels in order to ensure fuel quality and reduce performance problems with these fuels, and to enable more widespread acceptance of these fuels.

**Design:** Develop and enforce a state standard for neat biodiesel (B100), biodiesel blends, and ethanol blends. For biodiesel blends, the standards must include the conventional diesel portion of the blend. The base gasoline for ethanol blends must meet the standards for gasoline sold in that area. Enforcement of the standard should be designed to ensure that fuel taxes are being paid, blenders are registered with the State, to reduce fraud, ensure fuel that is delivered is as advertised, and eliminate consumer problems. Enforcement of this standard would be led by the Arizona Department of Weights and Measures. Certain exemptions might be acceptable (e.g., a school district blending biodiesel for use in its own school buses and not for outside sale). These standards should be in place by the end of 2008. Increased funding and resources are needed for enforcement of this measure.

**Goals to be determined:** Target an overall reduction in idling of \_\_% (or a reduction in idling fuel consumption of xx gallons of fuel) by year 20xx.

### TLU-7 Gasoline Tax

**Description:** A carbon tax for gasoline could reduce overall demand for fuel and related carbon dioxide emissions as well as providing a source of revenues for investment in efficient and low emitting transportation systems that further reduce emissions related to passenger vehicles.

**Design:** Starting in 20xx continuing through 20xx gasoline sold/consumed by \_\_\_\_\_ for passenger vehicles in Arizona would be subject to an X%/\$x tax on carbon content/fuel volume, with revenues targeted to investment in state and local programs for efficient and low emitting transportation systems such as [programs to be determined].

**Table 9.**

**Agriculture and Forestry Technical Work Group**  
**Summary List of Draft Policy Options (15 Total)**

#	Policy Name	Potential Next Steps
<b>FORESTRY</b>		
F-1	Forestland Protection from Developed Uses	Quantify for TWG review
F-2	Reforestation/Restoration of Forestland	CCS develops straw and quantifies
F-3a	Forest Ecosystem Management – Residential Lands	Quantify for TWG review
F-3b	Forest Ecosystem Management – Other Lands	Quantify for TWG review
F-4	Improved Commercialization of Biomass Gasification and Combined Cycle	CCS develops straw and quantifies
<b>AGRICULTURE</b>		
A-1a	Manure Management – Manure Digesters	CCS develops straw and quantifies
A-1b	Manure Management – Land Application	CCS develops straw and quantifies
A-2	Biomass Feedstocks for Electricity or Steam/Direct Heat	CCS develops straw and quantifies
A-3	Ethanol Production	CCS develops straw and quantifies
A-4	Change Feedstocks (optimize nitrogen for N <sub>2</sub> O reduction) Change Feedstocks	CCS develops straw and quantifies
A-5	Reduce Non-Farm Fertilizer Use	Draft recommendation without quantification
A-6	Grazing Management	CCS develops straw and quantifies
A-7	Convert Land to Grassland or Forest	CCS develops straw and quantifies
A-8	Agricultural Land Protection from Developed Uses	CCS develops straw and quantifies
A-9	Programs to Support Local Farming/Buy Local	CCS develops straw and quantifies

**Table 10.**

## **Description of Draft Agriculture and Forestry Policy Options**

### **FORESTRY**

#### **F-1 Forestland Protection from Developed Uses**

**Description:** Reduce the rate at which existing forestlands and forest cover are cleared and converted to developed uses or damaged by development that reduces productivity.

**Design:** Given the considerable carbon storage potential of forest and woodlands in Arizona, and the trend of loss of these vegetation types in the past two decades, we propose that policy initiatives decrease the conversion of forest and woodlands to urban and other developed uses to 50 percent or less of the rates of loss to these uses during the 1987-1997 period by 2010 and continuing through 2020. If a 50% reduction in conversion rates of forest to urban or other developed uses were achieved, this would translate to a decreased conversion rate of 380 acres/year to 190 acres/year (based on the FIA, NRI data estimates). If the rangeland type were assumed to include about 50% pinyon-juniper type, a 50% reduction in conversion rate would translate to decreased conversion rates of woodlands to urban or developed uses of 8,530 acres/year to a reduced rate of 4,260 acres/year.

#### **F-2 Reforestation/Restoration of Forestland**

**Description:** Expand forest cover (and associated carbon stocks) by regenerating or establishing forests in areas with little or no forest cover at present.

**Design:** From the TWG, we need to determine the number of acres of previously forested lands to be restored to their native forested state. The number of acres restored by 2010, 2020 and 2050 are needed. Additional information on anticipated forest type and stocking levels can also be used in the determination of GHG benefits (sequestration rates).

#### **F-3a Forest Ecosystem Management – Residential Lands**

**Description:** Manage sustainable thinning or biomass reduction from residential forestlands (intended to address fire and forest health issues) so that harvested biomass is directed to wood products and renewable energy instead of open burning or decay.

**Design:** Wildfire and other threats to forest health and sustainability, and community safety have led to a number of initiatives within the state of Arizona to reduce biomass in residential

forests and woodlands. Most of these efforts include some emphasis on utilizing the extracted woody biomass for wood products and/or energy production, rather than eliminating these materials through open burning, or storage or decay off site. Although this is an existing or potential objective for many restoration and biomass treatments on these lands, a greater emphasis and focus on wood products and/or energy production, through appropriate mechanisms, incentives, etc., is recommended. In particular, a reasonable goal of utilizing 50% or more of biomass extracted from residential lands for wood products and/or energy production is recommended to be achieved by 2010 and continuing through 2020. We also recommend that current and planned fuels treatments in Arizona be accelerated, so that all high priority areas (e.g., in wild land urban interface) are treated by 2015.

We further recommend that forest management practices and policies aimed at GHG reduction and carbon sequestration be reviewed by and coordinated with the Governor's Forest Health Oversight Council and Forest Health Advisory Council. It is quite likely that some policies already recommended by these councils, or may be recommended by the councils, are complementary and supportive of GHG reduction and carbon sequestration goals, while also promoting forest and ecosystem health and public safety. One of the key initiatives of the Forest Health Councils is a plan called "Sustainable Forests, Economies and Communities: A Statewide Strategy for Arizona Forests." This plan calls for spatial database development and hazard assessment, and prioritized treatments, among other things. This strategic plan is still in draft form (as of 02/21/06), and it would be useful to coordinate objectives and strategies of various forest and woodland policy options from the CCAG with this plan.

### F-3b Forest Ecosystem Management – Other Lands

**Description:** Increase sustainable thinning of biomass from forests and direct the harvested wood and wood waste to wood products and renewable energy.

**Design:**

**Scenario 1:**

- Wildfire and other threats to forest health and sustainability have led to a number of initiatives within the state of Arizona to reduce biomass in forests and woodlands. Many of these efforts include some emphasis on utilizing the extracted woody biomass for wood products and/or energy production, rather than eliminating these materials through open burning, or storage or decay off site. Although this is an existing objective or potential objective for many restoration and biomass treatments on these lands, a greater emphasis and focus on wood products and/or energy production, through appropriate mechanisms, incentives, etc., is recommended. In particular, a reasonable goal of utilizing 50% or more of biomass extracted for wood products and/or energy production is recommended. We also recommend that current and planned fuels treatments in Arizona be accelerated, so that all high priority areas (e.g., in valuable watersheds and habitats) are treated by 2015 and continuing through 2020.

- We further recommend that forest management practices and policies aimed at GHG reduction and carbon sequestration be reviewed by and coordinated with the Governor's Forest Health Oversight Council and Forest Health Advisory Council. It is quite likely that some policies already recommended by these councils, or may be recommended by the councils, are complementary and supportive of GHG reduction and carbon sequestration goals, while also promoting forest and ecosystem health and public safety. One of the key initiatives of the Forest Health Councils is a plan called "Sustainable Forests, Economies and Communities: A Statewide Strategy for Arizona Forests". This plan calls for spatial database development and hazard assessment, and prioritized treatments, among other things. This strategic plan is still in draft form (as of 02/21/06), and it would be useful to coordinate objectives and strategies of various forest and woodland policy options from the CCAG with this plan.

## Scenario 2:

- Accelerated restoration levels are anticipated as economic utilization activity increases demand for small diameter timber and woody biomass and decreases amounts paid for restoration/fuel reduction treatments through "service contracts" and actually results in land managers being paid for material removed through "timber sales" - as one measure, under current conditions approximately 52,800 acres of US Forest Service land was projected to be treated by forest thinning in 2005, with 195,700 CCF of timber 5" dbh or greater removed and 229,200 tons of residue generated; [x] acres of forestland regenerated/established at stocking rates of [x percent].
- Timing of implementation: an average of 53,700 acres of US Forest Service land on 6 national forests are proposed to be treated per year by thinning from 2005 thru 2015, with an annual average of 192,500 CCF of timber over 5" dbh removed and 248,800 tons of residue generated, under current conditions; [x] acres of forestland regenerated/established and restored from [2006-2020], including [x] acres saved per year in [2010 and 2020], including any necessary ramp up period. [Need data on prescribed fire treatments implemented annually and projected over 10 years]
- Implementing parties: US Forest Service; AZ State Land Dept.; DOI; Tribal lands; fire department & fire district fuel management crews; private landowners; local community based groups – AZ Sustainable Forest Partnership, Greater Flagstaff Forests Partnership, Prescott Area Wildland/Urban Interface Commission, etc.
- Other: Current emphasis is on the wildland/urban interface zones throughout the state where communities and infrastructure are threatened by destructive wildfire, most have developed "Community Wildfire Protection Plans"; AZ Forest Health Oversight/Advisory Councils are developing a proposal – "Sustainable Forests, Economies and Communities: A Statewide Strategy for Arizona Forests" that will prioritize treatments statewide; focus mostly on ponderosa pine forests, but pinyon-juniper woodland treatments also needed.

#### F-4 Improved Commercialization of Biomass Gasification and Combined Cycle

**Description:** Accelerate the rate of technology development and market deployment of biomass gasification and combined cycle technologies.

**Design:** To be determined based on the potential for expanded biomass supply and deployment of gasification technologies to convert it to direct fuel use and or electricity generation.

### AGRICULTURE

#### A-1a Manure Management – Manure Digesters

**Description:** Reduce CH<sub>4</sub> emissions from livestock manure through the use of manure digesters installed at dairies. Energy from the manure digesters is used to create heat or power, which offsets fossil fuel-based energy production and associated CO<sub>2</sub>, N<sub>2</sub>O and black carbon emissions.

**Design:** Implement [x] manure digesters at large dairies (>2,000 head) by 2010. This represents about [x%] of the dairy population by 2010. By 2020, expand the number of digesters to other large to medium-sized dairies to cover [x%] of the dairy population.

Because use of manure digesters at beef feedlots is not as far along in development as dairy applications, implement [x] demonstration projects at large beef feedlots (>5,000 head) by 2010. This represents about [x%] of the current feedlot population. Expand the use of digesters at beef feedlots to [x%] of the feedlot population by 2020. For at least one of these demonstration projects, investigate the use of a combined manure digester and ethanol production plant. In these projects, the spent grain from the ethanol process is used as feed for the cattle. Heat and electricity produced from the manure digester is used in the ethanol plant to reduce fossil-based energy use.

#### A-1b Manure Management – Land Application

**Description:** Reduce N<sub>2</sub>O emissions from dairy spread and other land application of dairy and feedlot cattle manure through the use of better application methods, such as direct injection of liquid waste. These application methods are designed to reduce contact of manure nitrogen with air (lowering the rate of denitrification) and the amount of manure nitrogen loss via leaching and runoff.

**Design:** TWG needs to specify the fraction of the dairy and beef feedlot populations to which these improved application methods will be applied (as well as any information on existing BAU practices, if available). Need to know the fraction of dairy cattle affected by 2010, 2020 and 2050. Need to know the fraction of feedlot cattle affected by 2010 and 2020.

#### A-2 Biomass Feedstocks for Electricity or Steam/Direct Heat

**Description:** Displace fossil fuel usage through the use of agricultural waste (e.g., pecan waste, other crop residue) as a feedstock for electricity or steam production.

**Design:** TWG needs to identify the mass of waste of different types to be used as feedstock from 2006-2020. The TWG also needs to identify the application of this waste (e.g. for electricity production or heating). This includes tons of each waste type used in 2010 and 2020.

### A-3 Ethanol Production

**Description:** Provide incentives for the production of ethanol from crops, agricultural waste, or other materials. Use of the ethanol will offset fossil fuel use (gasoline). Different incentive programs will be needed for crop (starch-based) ethanol production versus agricultural waste (cellulosic) ethanol production processes.

**Design:** From the TWG, we need information on the amount and type of crops (e.g. corn) produced in AZ beyond BAU that can be made available for the purposes of ethanol production (starch-based). Importing large amounts of crops for the purposes of ethanol production limits the benefits of this option due to the large embedded energy content of such crops. Amount and type of agricultural crop/waste or other material to be used to produce ethanol (cellulosic). Volume of ethanol to be produced by these processes beyond BAU. From the above, the volumes of ethanol produced annually by 2010 and 2020.

### A-4 Change Feedstocks (optimize nitrogen for N<sub>2</sub>O reduction) Change Feedstocks

**Description:** Reduce methane and nitrous oxide emissions from beef cattle and manure by changing (optimizing) livestock feedstocks. Vegetable oils are more dense digestible energy sources that require less fermentation in the rumen for energy to be released. CH<sub>4</sub> reductions may be achieved through improving the quality of the diet of the livestock, which tends to result in higher productivity. By needing fewer animals to produce a given amount of product, the amount of CH<sub>4</sub> emissions per unit of product is reduced. It may also be possible to reduce CH<sub>4</sub> by influencing the rumen fermentation process through feed additives, such as ionophores or probiotics.

Emissions of N<sub>2</sub>O resulting from livestock manure may be reduced by increasing the productivity of a smaller number of animals through improved diet. Use of low-protein feed may also reduce the amount of nitrogen excreted.

**Design:** From the TWG, we need to determine: change in feedstock for [x] head of cattle to a feed regimen that lowers methane and nitrous oxide emissions. Reduction of [x] percent in methane emissions from enteric fermentation achieved by the change in feed regimen. Reduction of [x] percent in nitrous oxide emissions during manure management by the change in feed regimen (i.e. due to decreases in manure nitrogen). TWG also needs to determine the fraction of beef feedlot population affected by the feedstock change by 2010 and 2020.



#### A-5 Reduce Non-Farm Fertilizer Use

**Description:** Reduce nitrous oxide emissions associated with application of ammonia-based fertilizers in residential, municipal and commercial use.

**Design:** From the TWG, we need to determine a program goal of bringing [x] acres of currently fertilized acres into best management practices that reduce nitrous oxide emissions. This means we need to identify estimates of lands that are potentially not managed in best management practices in AZ, as well as assessing the next benefits of this shift. Once this is done, the TWG will need to specify targets for [x] acres of land brought under new management practices by 2010 and 2020.

#### A-6 Grazing Management

**Description:** Increase carbon sequestration in grazing lands through rotational grazing, improvement of grazing crops, and/or grazing management.

**Design:** From the TWG, we need to determine a program goal of bringing [x] acres of poorly managed grazing land under new management practices. This means we need to identify estimates of grazing lands that are potentially poorly managed in AZ. Once this is done, the TWG will need to specify targets for [x] acres of grazing land brought under new management practices by 2010 and 2020.

#### A-7 Convert Land to Grassland or Forest

**Description:** Increase carbon sequestration in agricultural land by converting marginal land used for annual crops to permanent cover (grassland or forests).

**Design:** From the TWG, we need to determine a program goal of converting [x] acres of marginal agricultural land to grassland or forest. This means the TWG also needs to identify an estimate of marginal agricultural lands in AZ. Once the acreage of marginal agricultural land has been established, the TWG needs to specify the acres of land converted to grassland or forest by 2010 and 2020. Information on the native land cover for the area would also be factored in to the estimation of above and below ground carbon change.

#### A-8 Agricultural Land Protection from Developed Uses

**Description:** Reduce the rate at which existing crop and rangelands are converted to developed uses. The carbon sequestered in soils and aboveground biomass is higher in crop and rangelands than in developed land uses.

**Design:** The TWG needs to determine a program goal of reducing the rate of crop and rangeland loss to [x%] per year. The TWG can specify reductions in the rate of crop and rangeland losses in 2010 and 2020 (e.g. if there is a need for a ramp-up period).



### A-9 Programs to Support Local Farming/Buy Local

**Description:** Modification, enhancement and further development of local farm programs employed in Arizona can help reduce emissions of greenhouse gases. This GHG reduction occurs as a result of a reduction in vehicle-miles traveled and fuel usage associated with transporting agricultural products from other states or countries.

**Design:** The TWG needs to establish a program goal of shifting [x%] of specific types of agricultural products to locally grown sources. The percent shift occurring by 2010 and 2020 needs to be determined. Depending on available information, data from studies conducted in other areas might be needed to assess GHG benefits.

Table 11.

**Cross Cutting Issues Technical Work Group**  
**Summary List of Draft Policy Options (15 Total)**

#	Policy Name	Potential Next Steps
<b>CROSS CUTTING ISSUES</b>		
CC-1	State Greenhouse Gas Goals	Quantify for TWG review
CC-2	State Greenhouse Gas Reporting	Draft recommendation without quantification
CC-3	State Greenhouse Gas Registries	Draft recommendation without quantification
CC-4	State Climate Action Education	Draft recommendation without quantification

**Table 12.**

## **Description of Draft Cross Cutting Policy Options**

### **CROSS CUTTING ISSUES**

#### **CC-1 State Greenhouse Gas Goals**

**Description:** Statewide GHG emissions reduction goals and or targets for future time periods.

**Design:** Current TWG proposals include a statewide goal equal to...

#### **CC-2 State Greenhouse Gas Reporting**

**Description:** Measurement of GHG emissions at a statewide, sector or sub sector level to support tracking and management of emissions.

**Design:** To be determined.

#### **CC-3 State Greenhouse Gas Registries**

**Description:** Measurement of GHG emissions and or emissions reductions at a macro or micro-scale level to support tracking and management of emissions as well as potential recognition, baseline protection and or crediting of actions by implementing programs and parties in relation to an emissions reduction goal.

**Design:** To be determined.

#### **CC-4 State Climate Action Education**

**Description:** Education can support emissions reduction efforts at a macro or micro-scale level in relation to an emissions reduction program, policy or goal.

**Design:** To be determined.